PORTFOLIO ASSESSMENT GUIDELINES IN MATHEMATHICS LEARNING THROUGH REALISTIC APPROACH TO LCM (LEAST COMMON MULTIPLE) AND GCF (GREATEST COMMON FACTOR) SUBJECTS IN PRIMARY SCHOOL

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Abstract

Nowadays, teachers still consider that assessment process is separate part from the learning process so that there are many teachers who assess students only with tests or semester exams while the principles of mathematics learning assessment is a process to assess the specific learning objectives as mathematization, reflection, creation and creativity of students. In accordance with this principle of course assessment is part of the learning process is not just to assess the learning result. Therefore, teachers can use a portfolio as an class assessment since the portfolio is a collection of student work that were documented to see the progress of students' learning process. When planning portfolio tasks, teacher should look at the purpose of learning. Portfolio assessment guidelines are part of the learning process material with LCM and GCF Realistic approach which students actively to construct their own knowledge. The method that used in this learning is game and exploration. The process of learning was gathered into a collection of students' portfolios so that teachers can see the overall development of student learning. Portfolio assessment involves teachers, students and parents that the parents are involved to provide feedback on student learning. The assessment's guide of portfolio consists of preparation's guide of portfolio and portfolio assessment instruments. The steps in the portfolio preparation of mathematics realistic learning are: 1) portfolio planning, 2) guide of the portfolio tasks, 3) the preparation of the portfolio contents, and 4) students' self-assessment. The portfolio assessment very supports mathematics realistic learning because all the students' learning processes were documented systematically and orderly. Of these guidelines are expected to assist teachers in using portfolio assessment in the classroom easily and efficiently.

Keywords: Portfolio, Mathematics Realistic, LCM, GCF

INTRODUCTION

In mathematics learning at school, teachers thought that educational activities such as teaching processes, examination, and evaluation are separate(Shore & Grace, 2006: 10). Assessment should not merely assess students, but also could be used to direct and enhance student learning. In the old paradigm, which is still in the learning of mathematics at school, teachers consider that teaching process, examination, and evaluation are separate of educational activities (Shore & Grace, 2006: 10).

The principle of mathematics learning assessment is a process to assess the specific learning goals such as mathematization, reflection, creation and creativity of students.

Assessment is part of the learning process. It is not just to assess the result. The assessment principles of learning mathematics by de Lange (1987: 179-181) are:

1. Assessment should improve the learning process
2. Assessment methods that used must be able to explore students' understanding.
3. Assessment methods must be able to assess the students' ability of mathematization, reflection, inventive, and creativity. It means that assessment orientation are the learning process not only results.
4. Students' ability cannot be described with objective assessments only.

Therefore, assessment is part of learning that should be improving the learning process. Portfolio assessment is one authentic assessment that integrated with student learning in the classroom. Through portfolio assessment, could be seen the learning process of each student. Students can evaluate themselves through self-assessment form that is part of portfolio assessments. Through portfolio assessment, it will also be very easy to involve parents in the learning process.

INDONESIAN REALISTIC MATHEMATICS EDUCATION (IRME)

Indonesian Realistic Mathematics Education is a decrease of Realistic Mathematic Education that developed from the Netherlands but IRME has an Indonesian culture characteristic. Actually, mathematics is a human activity, which is a mathematical reflection of man activity. According to this approach, math class is not the place to move mathematics knowledge from teachers to students, but rather places the students rediscover the ideas and concepts of mathematics through exploration of real issues.Here the mathematics seen as a human activity that stems from problem solving. In the real world IRME used as a starting point for the development of mathematical concepts and ideas.. The characteristics of IRME are: (1) use of contexts (2) use of models for mathematical concept construction, (3) use students' creation and contributions, (4) student activity and interactivity in the learning process, (5) intertwining (Gravemeijer, 1994: 90).

In IRME, students learn to mathematization contextual issues that they are facing. Contextual issue is a real problem according to the situation, experience, and the condition of students in everyday life. mathematization divided into two, namely horizontal and vertical mathematization. In the horizontal mathematization students ranging from contextual problems of the real world, then the students try to solve it with their own language. This process is very possible every student has a different solution. In the horizontal math, students try to solve the problems of the real world in their own way, and to use their own language and symbols. The vertical mathematization is the formalization of mathematical concepts. In vertical mathematization, students try to organize a general procedure that could be used to solve similar problems directly without the help of the context (Hadi, 2002: 34).

GUIDELINES' OF PORTFOLIOS ASSESSMENT

Portfolio is a systematic and organized collection of student's work, which shows the student's skills and achievement. Portfolios are not just a collection of the student's paper or set of records that are stored in a folder. Portfolio is student's works, which created and arranged in such a way that shows student progress and lead to a goal of learn. Poulson & Mayer (Woolfolk, 2008: 565) explain about portfolios assessment that is:

> *a purposeful collection of students work that exhibits the student's efforts, progress, and achievements in one of more area. The collection must include students' participation in selecting contents, the criteria for judging merit, and evidence of students' self-reflection*.

Berryman, Russell & Richard (Santrock, 2008: 591) states that the role of portfolio assessment in a learning process is that the portfolio provides an opportunity to encourage students to make decisions and self-reflection. Portfolio could motivate students to think critically and deeply so that portfolios provide a good mechanism for evaluation progress and improvement of student learning.

The characteristics of portfolio assessment are:
1. A students' work contains willingness and documented which continuously to achieve the learning competencies.
2. Portfolios can measure each individual student achievement and be aware of the differences among students.
3. It is a collaborative approach to learning.
4. With portfolio, Students can asses himself
5. Portfolios can improve and pursue students' achievement.
6. There are relationship between assessment and learning.

Based on its characteristics, portfolio assessment is in accordance toward the principles of mathematics learning assessment. Portfolio assessment is an assessment that is not only oriented to the student learning outcomes but also monitoring the learning process. The steps in the portfolio preparation of mathematics learning through IRME approach are (Depdiknas, 2004: 8).

1. Portfolio Planning

Portfolio planning could be made in one semester or refer to the Basic Competencies that should be achieved by students. In portfolio planning, teacher already made a timeline. Through this portfolio planning could be seen that the portfolio assessment also improves learning, which is along with the principles of assessment through IRME approach. Table 1 explain about portfolio planning those references of basic competences of LCM and GCF subject at fourth grade Indonesian math lesson and the time schedule.

Table 1. Basic Competencies and Portfolio Task
Fourth Grade Indonesian Math Lesson

Basic Competences	Indicator	Portfolios Task
2.3 Determine Least Common Multiple (LCM) and Greatest Common Factor (GCF) 2.4 Solve the problem related LCM and GCF	1. Determine LCM 2. Determine GCF 3. Solve the problem related LCM and GCF	1. Document of work group. Students Worksheet 1: Activity Applause excited 2. Document of students' work group. Students Worksheet 1 and 2 3. Document of work students' group. Students Worksheet 3. Birthday party activity 4. Document of students' work group. Students Worksheet 3 and 4

Table 2. Planning Portfolio Assessment Schedule

Basic Competence	Time		
	Planning	Implementation	Evaluation
2.3 Determine Least Common Multiple (LCM) and Greatest Common Factor (GCF)	Wednesday, October 24, 2012	Wednesday, October 24, 2012 Wednesday, October 31, 2012	Thursday, November 1, 2012.
2.4 Solve the problem related LCM and GCF			

Description:

a. Planning: Teachers communicate to students about portfolios' content and assessment criteria.
b. Implementation: Work, arrange, and revise students' portfolio.
c. Evaluation: Dialogue between teachers and students about their portfolios and evaluate their learning outcome.

2. Guide of the portfolio tasks

In determining the portfolio assignments, teachers should involve students to choose the type of task that will be add to their portfolio collection. Determination of the portfolio assignment must fulfill the principle of learning assessment through IRME approach. The task of the portfolio should be able to explore what students know not what they do not know. Portfolio assessment must be able to assess the students' ability of matematization, reflection, inventive, and creativity, which means the learning assessment are process oriented not results oriented.

3. preparation of the portfolio contents

In compiling the contents of the portfolio, students could select their learning outcomes that will be collected, for example are: a) meaningful, b) the best work, c) the most preferred work, d) task that very difficult to do but they could managed it successfully, and e) has value memories for students. Students can choose which work to collect. Students are also having the opportunity to complete, revise, or replace the contents of the portfolio.

4. Students' self-assessment

Student self-assessment in the portfolio consists of a portfolio dialog sheet filled out by the teacher and self-assessment form filled out by the student. Portfolio sheet dialog contains interviews between teachers and students about the collection of the portfolio, developing competence of the student, teacher comments regarding the contents of the portfolio, and the development of students. Other than that, students also assess themselves based on the contents of their portfolios through a self-assessment form.

Self-assessment which is carried out in the assessment of this portfolio, should match the characteristics of IRME learning,that is IRME lesson ends with a confirmation and reflection to conclude the facts, concepts, and principles of mathematics and to determine student understanding (Hadi, Zulkardi & Hoogland, 2010: 159). Below is the component of a portfolio assessment that can be used for portfolio assessment in the classroom.

Table 3. Component of Portfolio Assessment

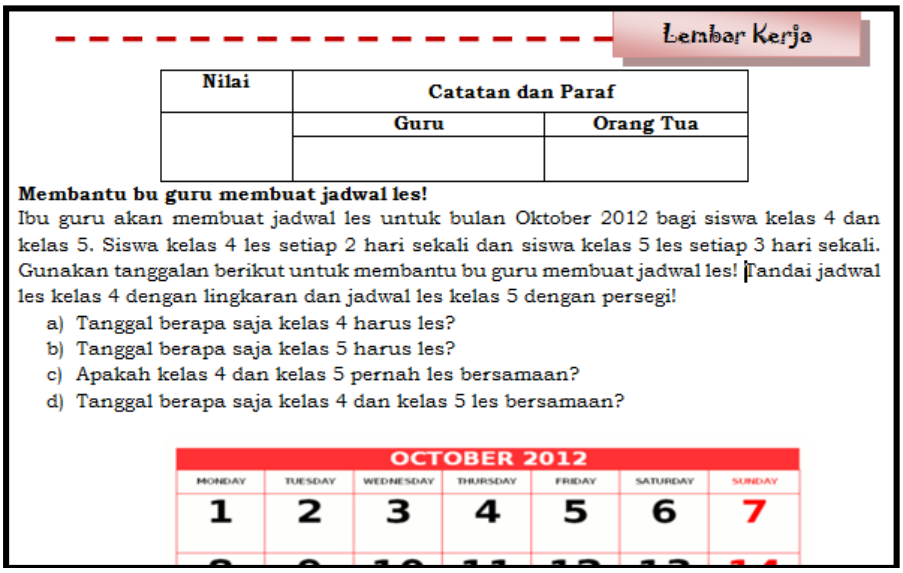
Students Name:

No.	Aspect	Maximal Score	Students' Score
1.	Content of Portfolio		
2.	Quality of the portfolio contents:		
	Students' Worksheet		
	Activity 1: Activity Applause excited		
	Activity 2: Birthday Party Activity		
	Observation Report		
	Students' works: Decoration Window		
3.	Students Effort to arrange the portfolio		
4.	Competency achievement		
	Total		
	Final Score		

PORTFOLIOS TASK FOR LCM IN REALISTIC MATHEMATICS

In learning LCM with realistic approaches used game with context "Applause Excited". This game will be presented in the portfolios task "Applause Excited". In this activity, students were divided into two groups; group A and group B. Group A and group B stand facing each other. The rules of the game are the teachers going to count slowly from 1 to 20, group A clapping the hands if teacher says number multiples of two. Group B clapping the hands if teacher says number multiples of three, for groups who do an error will get "wrong card" and groups that have a little "wrong card " will be a winner.

Upon completion of this activity, the teacher guided students to construct their own knowledge of the LCM. The teacher asked the students some questions, did two groups ever clapped together? At the time of group A and B clapping together that common multiple of 2 and 3. From here, students can understand the concept of LCM. Then the students were asked to describe the sense of the least common multiple.After this activity, students are doing worksheets. This worksheet will be part of a collection of portfolios. Teachers and parents are involved providing motivation or feedback to students in the notes column.



Lembar Kerja

Nilai	Catatan dan Paraf	
	Guru	Orang Tua

Membantu bu guru membuat jadwal les!

Ibu guru akan membuat jadwal les untuk bulan Oktober 2012 bagi siswa kelas 4 dan kelas 5. Siswa kelas 4 les setiap 2 hari sekali dan siswa kelas 5 les setiap 3 hari sekali. Gunakan tanggalan berikut untuk membantu bu guru membuat jadwal les! Tandai jadwal les kelas 4 dengan lingkaran dan jadwal les kelas 5 dengan persegi!

a) Tanggal berapa saja kelas 4 harus les?
b) Tanggal berapa saja kelas 5 harus les?
c) Apakah kelas 4 dan kelas 5 pernah les bersamaan?
d) Tanggal berapa saja kelas 4 dan kelas 5 les bersamaan?

OCTOBER 2012

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1	2	3	4	5	6	7

Figure 1. Samples of Portfolio Task for LCM

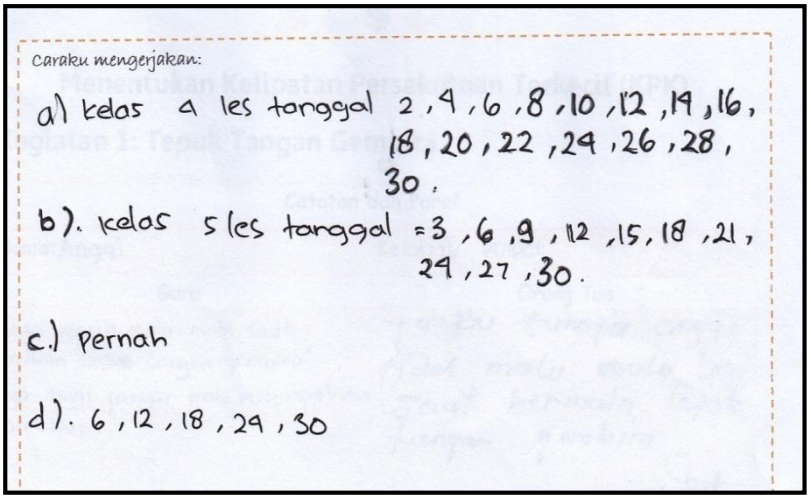
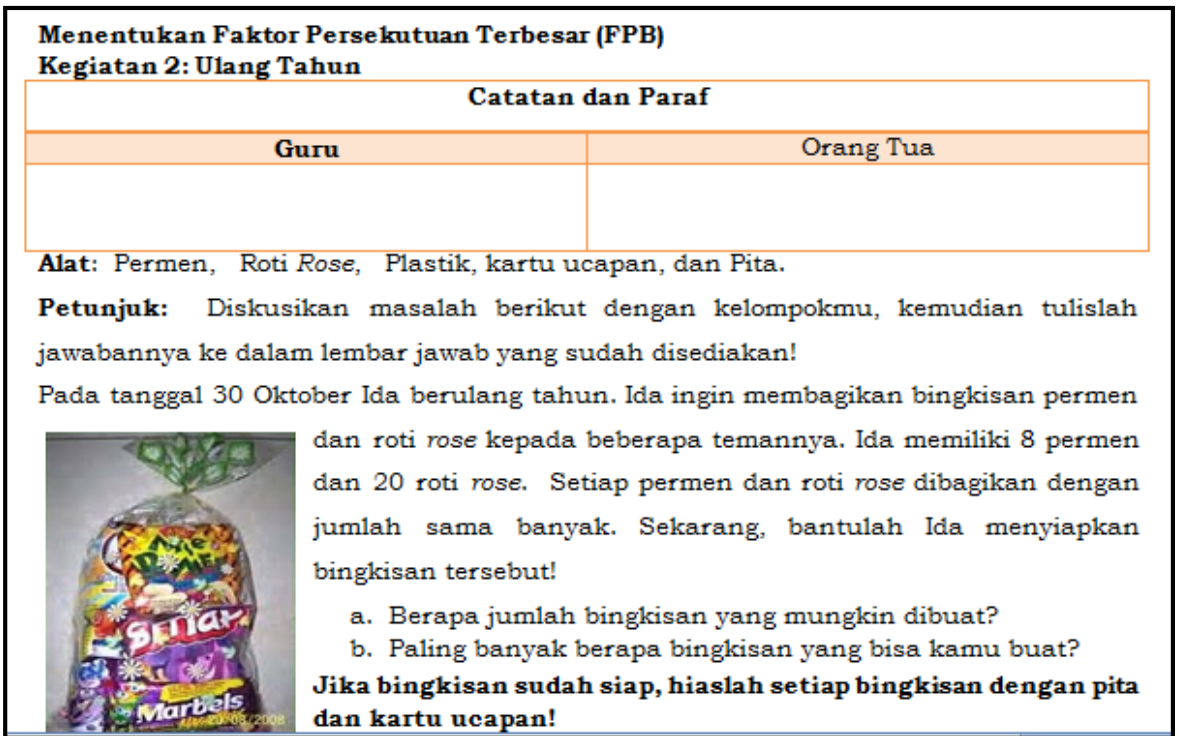


Figure 2. Sample ofStudents' Strategy in LCM Problem

PORTFOLIOS TASK FOR GCF IN REALISTIC MATHEMATICS

Learning methods used in studying the GCF is "Exploration". In learning GCF, students use learning context "Birthday Gift". In this activity students are divided into groups to explore creating a "Birthday Gift" from 8 candy, 20 rolls, plastic bags, ribbon, greeting cards. Each group was asked to write down any exploration results on the students' worksheet.



Menentukan Faktor Persekutuan Terbesar (FPB)
Kegiatan 2: Ulang Tahun

Catatan dan Paraf	
Guru	Orang Tua

Alat: Permen, Roti *Rose*, Plastik, kartu ucapan, dan Pita.

Petunjuk: Diskusikan masalah berikut dengan kelompokmu, kemudian tulislah jawabannya ke dalam lembar jawab yang sudah disediakan!

Pada tanggal 30 Oktober Ida berulang tahun. Ida ingin membagikan bingkisan permen dan roti *rose* kepada beberapa temannya. Ida memiliki 8 permen dan 20 roti *rose*. Setiap permen dan roti *rose* dibagikan dengan jumlah sama banyak. Sekarang, bantulah Ida menyiapkan bingkisan tersebut!

a. Berapa jumlah bingkisan yang mungkin dibuat?
b. Paling banyak berapa bingkisan yang bisa kamu buat?

Jika bingkisan sudah siap, hiaslah setiap bingkisan dengan pita dan kartu ucapan!

Figure 3. GCF portfolios task in students worksheet.

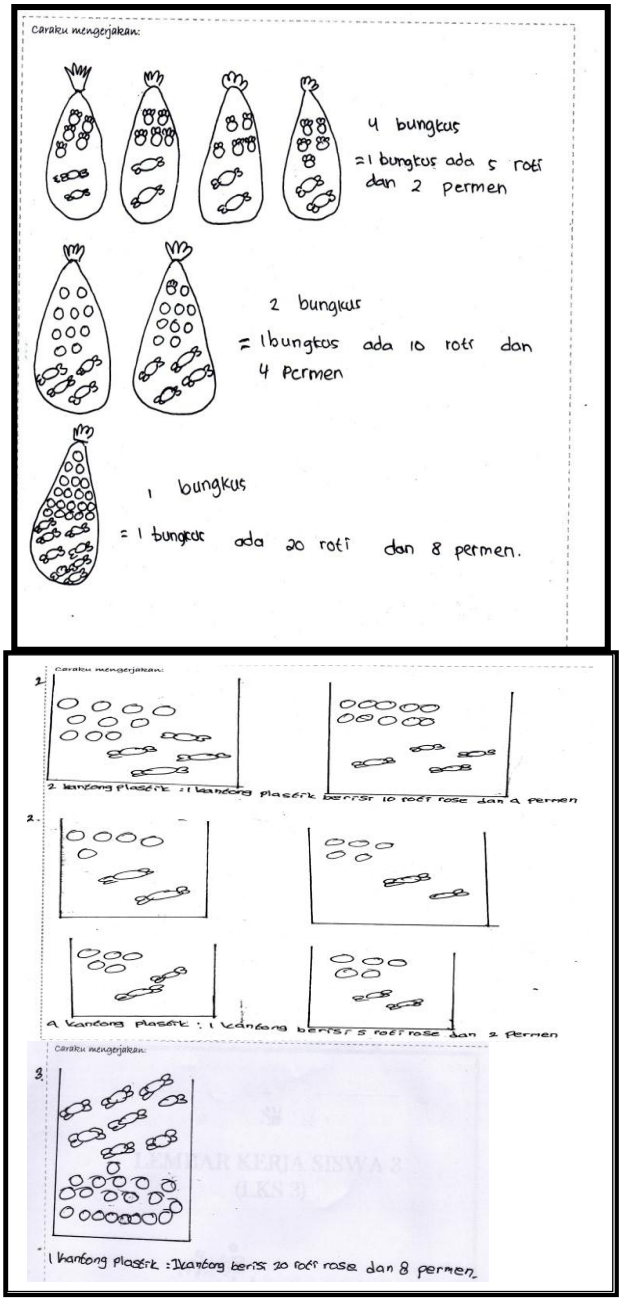


Figure 4. Sample of Students' Strategy in GCF Problem

After students explore and find solutions to the problems they solve then they should describe their findings and write mathematical symbols from the picture they earn. With teacher guidance, students found a link between their models of images with previous studies that numbers factor. Through this activity, students find that their gifts can make a common factor from 8 and 20. Then, students asked to describe the concept of Greatest Common Factor.

CONCLUSION

Assessment is part of learning. Based on the characteristics of portfolio assessment we could conclude that principles of assessment in IRME are accordance with the portfolio assessment. Which, portfolio assessment is not only oriented on student learning outcomes but also monitoring the learning process. With a portfolio, students can reflect

on their learning process. In IRME learning, there is also confirmation and reflection to conclude the facts, concepts, and principles of mathematics that has been studied and to determine student understanding.

The portfolio assessment very supports mathematics realistic learning because all the students' learning processes were documented systematically and orderly. Of these guidelines expected to assist teachers in using portfolio assessment in the classroom easily and efficiently.

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